

poor intimate contact, a D/A converter can be used to adjust the threshold level in accordance with the area of the preparation applied to the subject and the output voltage.

Also, an A/D converter is used in place of the voltage comparator

5 10B to change detection conditions in accordance with the output voltage etc. Additionally, a voltage amplifier for amplifying the output signal 18 may be added to the forward stage etc. of the voltage comparator 10B, or a feedback signal of the output voltage may be used as the threshold level, so
10 that the threshold level has a voltage value proportional to the output voltage.

For the detection of a reactive current, a sample-and-hold circuit may conveniently be used to detect positive portions of the reactive current. Instead of detecting only the

15 reactive current, the current including a current for conveying the drug may be detected, or a part of the reactive current may be detected. Further, a function for detecting a part of the DC current may be provided.

FIG. 5 illustrates an example of a detecting circuit for
20 residual voltage to detect the residual voltage developed across the skin (load). In the present embodiment, an intermittent energization is used. Referring to FIG. 5, reference numerals 19, 20, and 21 denote an output circuit, an analog switch, and an output terminal A, respectively.

25 Reference numerals 22, 23, and 24 denote an output terminal B, a discharging fixed resistor, an output signal to the voltage comparator, respectively. Reference numerals 25, 26 and 27,

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and 28 denote a voltage comaprator, voltage adjusting fixed resistors, and an output signal from the voltage comparator, respectively.

FIG. 6 illustrates voltage waveforms across the output terminals. Referring to FIG. 6, a voltage waveform 29 describes the output signal across the output terminals when a load is connected across the output terminals and a voltage waveform 30 represents the output signal across the output terminals when no load is connected across the output terminals.

The DC output voltage from the output circuit 19 is usually outputted to the output terminal 21 through the analog switch 20. When the residual voltage is detected, the analog switch 20 is a non-conduction state by a signal issued from the control circuit. Then, the voltage comparator 25 compares the output signal 24 when the output voltage sent to the output terminal 21 is interrupted, with the threshold level that is produced by dividing the output voltage from the output circuit 19 by the fixed resistors 26 and 27. If the output signal 24 indicative of the residual voltage stored in the skin or the mucous is higher than the threshold level, the voltage comparator 25 generates an output signal 28 of "H", indicating to the control circuit that the conduction state is normal. Conversely, if the output signal 24 is lower than the threshold level, the voltage comparator 25 generates the output signal 28 of "L", indicating to the control circuit that the conduction state is abnormal.

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The fixed resistor 23 is provided to prevent the output terminal 21 from being open-circuited when the analog switch 20 is the non-conduction state and there is no loading, and to allow the residual voltage on the output terminal 21 to discharge with an arbitrary time constant when the analog switch 20 is the non-conduction state and there is a loading. The output signal 24 may be obtained by dividing a voltage on the output terminal 21 or a signal with a level lowered to a voltage level for the control circuit, and then which may be provided in a variety of ways. Likewise, the threshold level may be modified in a variety of ways just as in the detection of the reactive current.

The residual voltage is measured or detected in synchronism with the interruption of the output voltage and therefore the measurement or detection of the residual voltage can be performed in several microseconds to several seconds without affecting the output. Just as in the measurement of the reactive current, adjusting the time constant and digitizing the voltage with an A/D converter, or adjusting the time between the interruption and reading-in allows determining of whether the preparation is in intimate contact with the transdermal or the transmcosal.

The output waveform used for detecting the reactive current in the present invention contains a DC component for drug dosage and a frequency component for detection of a capacitive impedance. Means for detecting the impedance may be one that integrates or peak-holds the current resulting